REMARKS

In response to a Non-Final Office Action issued November 16, 2010, reconsideration of the application in light of the amendments and the following remarks is respectfully requested.

Status of the Claims

Claims 1-10 are pending. Claims 7-9 were withdrawn from consideration. Claims 1-6 and 10 were rejected. In this response, claims 1, 3, 6 and 10 have been amended. Claims 2 and 4-5 have been canceled. Claims 11-13 have been added. No new matter has been introduced.

Objections to Claim

Claim 10 was objected to because of a grammatical error. The error has been corrected by deleting a phrase, "completely sintered." No new matter has been introduced.

Rejections under 35 U.S.C. § 102

Claims 1 and 10 have been rejected under 35 USC § 102(b) as being anticipated by Harris (US 3,445,148). The rejection is respectfully traversed, and reconsideration is requested.

Claims 1 and 10 have been amended to incorporate limitations recited in claims 2, 4 and 5 which have been canceled a result of the amendment. Support of this amendment can be found in paragraphs [0014] – [0017] of the published application.

The present invention provides an oil-impregnated sintered bearing which efficiently functions under a small, large or remarkably large shear load applied to a rotating shaft without having different types of bearings, which would increase the production cost (Specification, paragraphs [0047] – [0050] of the published application). When a relatively *small* torque is transmitted to rotate the rotating shaft, a shear load transmitted to the rotating shaft is also small and runout or deflection does not occur on the rotating shaft. Therefore, the surface of the rotating shaft comes into contact with the journal part, and the rotating shaft is supported by the journal part

serving as a friction surface. Since the journal part thermally expands due to pumping action and frictional heat caused by rotation of the rotating shaft, lubricating oil comes out of the inside of the bearing body to lubricate the friction surface.

Then, when a *large* torque is exerted to rotate the rotating shaft, a shear load exerted on the rotating shaft becomes large. Since the runout occurs in the rotating shaft, the lubricating oil lubricating between the rotating shaft and the journal part is extruded to the one enlarged diameter part and the other the enlarged diameter part, while being pressurized by the runout of the rotating shaft so as to be pushed against enlarged diameter parts. However, because the enlarged diameter parts are thickly formed (i.e., high density), the lubricating oil is ***not*** impregnated into the enlarger diameter parts and remains between the rotating shaft and the enlarged diameter parts to apply reaction forces to the rotating shaft, which prevents the deviation from the center of the rotating shaft with respect to the bearing. This action is called a "push-back" caused by the lubricating oil remaining between the rotating shaft and the enlarged diameter parts.

However, when a shear load applied to the rotating shaft is *remarkably large* and the push-back action does not sufficiently function, the rotating shaft is supported while the axis of the rotating shaft is inclined in the bearing body. In this case, as shown in FIG. 2, the surface of the rotating shaft comes into contact with the enlarged diameter parts not by a point but by a line. As a result, excessive abrasion and overheating between the rotating shaft and the bearing body may be prevented.

The above structural features, which are recited in claims 1 and 10, allow the present invention to correspond to any size of shear load in an efficient manner without having any additional parts or manufacturing process. Claims 1 and 10 have been particularly amended to make it clear that the shaft is supported not only by the journal parts by also by the enlarged diameter (first) parts.

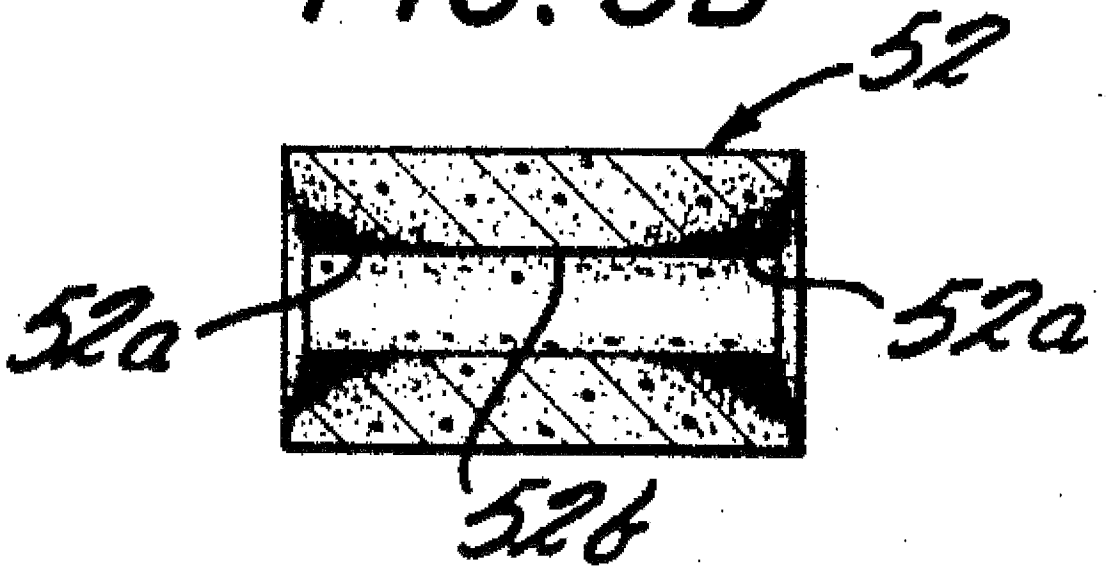
Amended claim 1 recites newly added features which are: 1) each of the enlarged diameter parts has a taper angle which changes stepwise with respect to a longitudinal direction of the

enlarged diameter part; 2) a taper angle between one of the first parts and an axial direction of the bearing body and a taper angle between the other first part and the axial direction of the bearing body are equal to each other and are 3° or less; and 3) a line obliquely extending along an inclined surface of one of the first parts is arranged parallel to a line obliquely extending along an inclined surface of the other first part, and a distance between the lines is substantially equal to the diameter of the rotating shaft. These inventive features are not taught or suggested by Harris. Accordingly, Applicant respectfully requests that the rejection under 35 U.S.C. 102(b) be withdrawn.

Harris teaches a method of manufacturing a porous bearing of *compacted and sintered metal* in which the bearing surface is composed of relatively non-porous zones for carrying the bearing loads and porous zones for lubricating the members. In particular, a load-bearing zone 52a of Fig. 3B carries the shaft. This configuration provides only a single portion that supports the bearing loads and Harris fails to teach anything equivalent to the enlarged diameter part of the present invention.

Attached is an enlarged view of Fig. 3B of Harris. As noted, in the office action the Examiner states that Harris discloses enlarged diameter parts (at 52a) that are provided on both sides of the journal part. However, as can be seen from the enlarged view, and by reading Harris at Col. 5, lines 36-44, there is a "load-bearing portion 52a of relatively greater density and lower permeability and porosity in the zones adjacent the ends of the internal surface and a zone 52b of relatively lower density an higher permeability and porosity in the longitudinally central portion of the bearing surface." Thus, what the Examiner calls an enlarged part is merely black dots showing greater density on a cylindrical surface. Only at the outer flange is there an increase in diameter and that flange cannot hold the shaft.

FIG. 3B



While Harris does show a greater density at the outer edges of the journal surface, there is no indication that it is due to "cavities exposed on an inner surface [that are] smaller in size and *fewer in number*." Greater density may be unrelated to cavities or can depend on either of size and/or number. Furthermore, the high density in Harris is created differently from the present invention where a higher sintering density is obtained by adjusting pressure applied to the respective parts (Specification, paragraph [0045] of the published application). Harris explicitly states that "[T]he dimensional variations from the final surface contours are in the form of *projections* from the normal surface.... the *projections* on the (compacted powdered metal) blank are further compressed and at the same time the final bearing surface contours are obtained. The coining step results in the creation of significantly denser material...(Harris, col. 2, lines 40-49)" Since Harris merely discloses sintering, at most it suggests a uniform number of cavities, but of smaller size, but not both.

Further, the expanded surfaces at the ends of the bearing hole are at an angle that will not allow them to support the shaft. However, the claims as amended require that "the journal part and first parts respectively support the shaft." Thus, Harris fails to discuss the present claims 1 and 10 as originally recited, and certainly not as currently amended.

Rejections under 35 U.S.C. § 103

Claims 2, 3, 5 and 6 have been rejected under 35 USC § 103(a) as being unpatentable over Harris (US 3,445,148) in view of Tanaka (US Pub 2002/0001420). Claim 4 has been rejected under 35 USC § 103(a) as being unpatentable over Harris. Applicant respectfully disagrees.

Claims 2 and 5 have been canceled. Claim 3 has been amended to further define the invention. Support for this amendment can be found in paragraph [0069] of the published application. Claim 6 has been also amended to clarify the limitation by adding a phrase. Support can be found in paragraphs [0018] and [0070] of the published application. No new matter has been introduced as a result of these amendments.

Tanaka provides an oil-impregnated bearing comprised of a cylindrical porous bearing body made of sintered metal and a non-porous slide member made of a ***resinous material*** such as fluororesin. The slide member is one of the essential features of Tanaka. In Tanaka, this resinous material is added to avoid "considerable friction resistance between the two members because of a ***metal-to-metal contact*** when an oil film is not formed under a low temperature (Tanaka, paragraph [008])." Accordingly, one of ordinary skill in the art would not be motivated to combine the Tanaka invention with the bearing of Harris which is composed of metal materials only, which would trigger friction resistance that Tanaka is seeking to avoid. According to MEPE 2143.01,

> The ***mere fact*** that references can be combined or modified does ***not*** render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art.

It would not have been obvious to one or ordinary skill in the art to combine Harris and Tanaka to provide all features of the present invention. Thus, rejections based on the combination of these inventions are moot.

In addition, the Examiner cites to Figs. 10 and 12, as well as paragraphs [0040-0042] to show that the Tanaka support surfaces meet the language of claims 2, 3, 5 and 6. In particular, the limitation provides that the surfaces on each side of the journal part form parallel lines that are the width of the shaft. However, a careful reading of the cited passages shows no such information. Further, nothing in Tanaka supports a limit of 3° on the angles. Thus, not only is the combination of Harris and Tanaka improper, the combination fails to disclose all of the subject matter of the claims.

In addition, new claims 11 - 13 have been added. Support of these claims can be found in paragraphs [0077] and [0078]. In particular, claim 11 recites an oil-impregnated sintered bearing "*wherein... an enlarged diameter parts that is provided* ***on only one side*** *of the journal part, and a* ***chamfered portion*** *that is provided on the other side of the journal part.*" No prior art reference, or any combination thereof, teaches or suggest the above described a sintered bearing, which makes claim 11 unobvious. Claims 12 and 13 directly depends from claim 11, and thus, unobvious either.

In light of discussion above, Applicant respectfully requests that the rejections of claims under 35 U.S.C. § 103(a) be withdrawn.

CONCLUSION

In view of the above amendments and remarks, Applicants believe the pending application and all pending claims are in condition for allowance, and earnestly solicit same.

If the Examiner feels that any remaining issues can be resolved by a Supplemental or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

The Commissioner is hereby authorized to charge any unpaid fees deemed required in connection with this submission, or to credit any overpayment, to Deposit Account No. 50-4570.

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Respectfully submitted,

By _____

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